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Distribution of Phytoplankton in Idaho Lakes

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This is a data report presenting the species and abundance of phytoplankton in the 13 lakes sampled by the National Eutrophication Survey in the State of Idaho. Results from the calculation of several water quality indices are also included (Nygaard's Trophic State Index, Palmer's Organic Pollution Index, and species diversity and abundance indices).

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DISTRIBUTION OF PHYTOPLANKTON IN IDAHO LAKES

by

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FOREWORD

Protection of the environment requires effective regulatory actions which are based on sound technical and scientific information. This information must include the quantitative description and linking of pollutant sources, transport mechanisms, interactions, and resulting effects on man and his environment. Because of the complexities involved, assessment of specific pollutants in the environment requires a total systems approach which transcends the media of air, water, and land. The Environmental Monitoring and Support Laboratory-Las Vegas contributes to the formation and enhancement of a sound monitoring data base for exposure assessment through programs designed to:

- develop and optimize systems and strategies for monitoring pollutants and their impact on the environment
- demonstrate new monitoring systems and technologies by applying them to fulfill special monitoring needs of the Agency's operating programs

This report presents the species and abundance of phytoplankton in the 13 lakes sampled by the National Eutrophication Survey in the State of Idaho, along with results from the calculation of several commonly used biological indices of water quality and community structure. These data can be used to biologically characterize the study lakes, and as baseline data for future investigations. This report was written for use by Federal, State, and local governmental agencies concerned with water quality analysis, monitoring, and/or regulation. Private industry and individuals similarly involved with the biological aspects of water quality will find the document useful. For further information contact the Water and Land Quality Branch, Monitoring Operations Division.

George B. Morgan
Director
Environmental Monitoring and Support Laboratory
Las Vegas

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INTRODUCTION

The collection and analysis of phytoplankton data were included in the National Eutrophication Survey in an effort to determine relationships between algal characteristics and trophic status of individual lakes.

During spring, summer, and fall of 1975, the Survey sampled 156 lakes in 11 States. Over 450 algal species and varieties were identified and enumerated from the 430 water samples examined.

This report presents the species and abundance of phytoplankton in the 13 lakes sampled in the State of Idaho (Table 1). The Nygaard's Trophic State (Nygaard 1949), Palmer's Organic Pollution (Palmer 1969), and species diversity and abundance indices are also included.

TABLE 1. LAKES SAMPLED IN THE STATE OF IDAHO

STORET No.	Lake Name	County
1601	American Falls Reservoir	Bannock, Bingham, Power
1602	Cascade Lake	Valley
1603	Coeur d'Alene	Benewah, Kootenai
1604	Dworshak Reservoir	Clearwater
1605	Hauser Lake	Kootenai
1606	Hayden Lake	Kootenai
1607	Island Park Reservoir	Fremont
1608	Lake Lowell (Deer Flat Reservoir)	Canyon
1609	Magic Reservoir	Blaine, Camas
1610	Palisades Reservoir	Bonneville (Lincoln in Wyo.)
1611	Lower Payette	Valley
1612	Lower Twin Lakes	Kootenai

(Continued)

TABLE 1. LAKES SAMPLED IN THE STATE OF IDAHO (Continued)

STORET No.	Lake Name	County
0613	Upper Twin Lakes	Kootenai

MATERIALS AND METHODS

LAKE AND SITE SELECTION

Lakes and reservoirs included in the Survey were selected through discussions with State water pollution agency personnel and U.S. Environmental Protection Agency Regional Offices (U.S. Environmental Protection Agency 1975). Screening and selection strongly emphasized lakes with actual or potential accelerated eutrophication problems. As a result, the selection was limited to lakes:

(1) impacted by one or more municipal sewage treatment plant outfalls either directly into the lake or by discharge to an inlet tributary within approximately 40 kilometers of the lake;

(2) 40 hectares or larger in size; and

(3) with a mean hydraulic retention time of at least 30 days.

Specific selection criteria were waived for some lakes of particular State interest.

Sampling sites for a lake were selected based on available information on lake morphometry, potential major sources of nutrient input, and on-site judgment of the field limnologist (U.S. Environmental Protection Agency 1975). Primary sampling sites were chosen to reflect the deepest portion of each major basin in a test lake. Where many basins were present, selection was guided by nutrient source information on hand. At each sampling site, a depth-integrated phytoplankton sample was taken. Depth-integrated samples were uniform mixtures of water from the surface to a depth of 15 feet (4.6 meters) or from the surface to the lower limit of the photic zone representing 1 percent of the incident light, whichever was greater. If the depth at the sampling site was less than 15 feet (4.6 meters), the sample was taken from just off the bottom to the surface. Normally, a lake was sampled three times in 1 year, providing information on spring, summer, and fall conditions.

SAMPLE PREPARATION

To preserve the sample 4 milliliters (ml) of Acid-Lugol's solution (Prescott 1970) were added to each 130-ml sample from each site at the time of collection. The samples were shipped to the Environmental Monitoring and Support Laboratory, Las Vegas, Nevada, where equal volumes from each site

were mixed to form two 130-ml composite samples for a given lake. One composite sample was put into storage and the other was used for the examination.

Prior to examination, the composite samples were concentrated by the settling method. Solids were allowed to settle for at least 24 hours prior siphoning off the supernate. The volume of the removed supernate and the volume of the remaining concentrate were measured and concentrations determined. A small (8-ml) library subsample of the concentrate was then taken. The remaining concentrate was gently agitated to resuspend the plankton and poured into a capped, graduated test tube. If a preliminary examination of a sample indicated the need for a more concentrated sample, t contents of the test tube were further concentrated by repeating the settlin method. Final concentrations varied from 15 to 40 times the original.

Permanent slides were prepared from concentrated samples after analysis was complete. A ring of clear Karo® corn syrup with phenol (a few crystals phenol were added to each 100 ml of syrup) was placed on a glass slide. A drop of superconcentrate from the bottom of the test tube was placed in the ring. This solution was thoroughly mixed and topped with a coverglass. Aft the syrup at the edges of the coverglass had hardened, the excess was scrape away and the mount was sealed with clear fingernail polish. Permanent diato slides were prepared by drying sample material on a coverglass, heating in a muffle furnace at 400° C for 45 minutes, and mounting in Hyrax®. Finally, t mounts were sealed with clear fingernail polish.

Backup samples, library samples, permanent sample slides, and Hyrax®-mounted diatom slides are being stored and maintained at the Environmental Monitoring and Support Laboratory-Las Vegas.

EXAMINATION

The phytoplankton samples were examined with the aid of binocular compound microscopes. A preliminary examination was performed to precisely identify and list all forms encountered. The length of this examination varied depending on the complexity of the sample. An attempt was made to fi and identify all of the forms present in each sample. Often forms were observed which could not be identified to species or to genus. Abbreviated descriptions were used to keep a record of these forms (e.g., lunate cell, blue-green filament, Navicula #1). Diatom slides were examined using a standard light microscope. If greater resolution was essential to accurate identify the diatoms, a phase-contrast microscope was used.

After the species list was compiled, phytoplankton were enumerated usin a Neubauer Counting Chamber with a 40X objective lens and a 10X ocular lens. All forms within each field were counted. The count was continued until a minimum of 100 fields had been viewed, or until the dominant form had been observed a minimum of 100 times.

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QUALITY CONTROL

Project phycologists performed internal quality control intercomparisons regularly on 7 percent of the species identification and counts. Although an individual had primary responsibility for analyzing a sample, taxonomic problems were discussed among the phycologists.

Additional quality control checks were performed on the Survey samples by Dr. G. W. Prescott of the University of Montana at the rate of 5 percent. Quality control checks were made on 75 percent of these samples to verify species identifications while checks were made on the remaining 25 percent of the samples to verify genus counts. Presently, the agreement between quality control checks for species identification and genus enumerations is satisfactory.

RESULTS

A phytoplankton species list for the State is presented in Appendix A. Appendix B summarizes all of the phytoplankton data collected from the State by the Survey. The latter is organized by lake, and includes an alphabetical phytoplankton species list with concentrations for individual species given by sampling date. Results from the application of several indices are presented (Nygaard's Trophic State, Palmer's Organic Pollution, and species diversity and abundance). Each lake has been assigned a four-digit STORET number. (STORET (STOrage and RETrieval) is the U.S. Environmental Protection Agency's computer system which processes and maintains water quality data.) The first two digits of the STORET number identify the State; the last two digits identify the lake.

NYGAARD'S TROPHIC STATE INDICES

Five indices devised by Nygaard (1949) were proposed under the assumption that certain algal groups are indicative of levels of nutrient enrichment. These indices were calculated in order to aid in determining the surveyed lakes' trophic status. As a general rule, Cyanophyta, Euglenophyta, centric diatoms, and members of the Chlorococcales are found in waters that are eutrophic (rich in nutrients), while desmids and many pennate diatoms generally cannot tolerate high nutrient levels and so are found in oligotrophic waters (poor in nutrients).

In applying the indices to the Survey data, the number of taxa in each major group was determined from the species list for each sample. The ratios of these groups give numerical values which can be used as a biological index of water richness. The five indices and the ranges of values established for Danish lakes by Nygaard for each trophic state are presented in Table 2. The appropriate symbol, (E) eutrophic and (O) oligotrophic, follows each calculated value in the tables in Appendix B. A question mark (?) following a calculated value in these tables was entered when that value was within the range of both classifications.

PALMER'S ORGANIC POLLUTION INDICES

Palmer (1969) analyzed reports from 165 authors and developed algal pollution indices for use in rating water samples with high organic pollution. Two lists of organic-pollution-tolerant forms were prepared, one containing 20 genera, the other, 20 species (Tables 3 and 4). Each form was assigned a pollution index number ranging from 1 for moderately tolerant forms to 6 for

TABLE 2. NYGAARD'S TROPHIC STATE INDICES ADAPTED FROM HUTCHINSON (1967)

Index	Calculation	Oligotrophic	Eutrophic
Myxophycean	$\frac{\text{Myxophyceae}}{\text{Desmideae}}$	0.0-0.4	0.1-3.0
Chlorophycean	$\frac{\text{Chlorococcales}}{\text{Desmideae}}$	0.0-0.7	0.2-9.0
Diatom	$\frac{\text{Centric Diatoms}}{\text{Pennate Diatoms}}$	0.0-0.3	0.0-1.75
Euglenophyte	$\frac{\text{Euglenophyta}}{\text{Myxophyceae + Chlorococcales}}$	0.0-0.2	0.0-1.0
Compound	$\frac{\text{Myxophyceae + Chlorococcales + Centric Diatoms + Euglenophyta}}{\text{Desmideae}}$	0.0-1.0	1.2-25

TABLE 3. ALGAL GENUS POLLUTION INDEX (Palmer 1969)

Genus	Pollution Index
Anacystis	1
Ankistrodesmus	2
Chlamydomonas	4
Chlorella	3
Closterium	1
Cyclotella	1
Euglena	5
Gomphonema	1
Lepocinclis	1
Melosira	1
Micractinium	1
Navicula	3
Nitzschia	3
Oscillatoria	5
Pandorina	1
Phacus	2
Phormidium	1
Scenedesmus	4
Stigeoclonium	2
Synedra	2

TABLE 4. ALGAL SPECIES POLLUTION INDEX (Palmer 1969)

Species	Pollution Index
Ankistrodesmus falcatus	3
Arthrospira jenneri	2
Chlorella vulgaris	2
Cyclotella meneghiniana	2
Euglena gracilis	1
Euglena viridis	6
Gomphonema parvulum	1
Melosira varians	2
Navicula cryptocephala	1
Nitzschia acicularis	1
Nitzschia palea	5
Oscillatoria chlorina	2
Oscillatoria limosa	4
Oscillatoria princeps	1
Oscillatoria putrida	1
Oscillatoria tenuis	4
Pandorina morum	3
Scenedesmus quadricauda	4
Stigeoclonium tenue	3
Synedra ulna	3

extremely tolerant forms. Palmer based the index numbers on occurrence records and/or where emphasized by the authors as being especially tolerant of organic pollution.

In analyzing a water sample, any of the 20 genera or species of algae present in concentrations of 50 per milliliter or more are recorded. The pollution index numbers of the algae present are totaled, providing a genus score and a species score. Palmer determined that a score of 20 or more for either index can be taken as evidence of high organic pollution, while a score of 15 to 19 is taken as probable evidence of high organic pollution. Lower figures suggest that the organic pollution of the sample is not high, that the sample is not representative, or that some substance or factor interfering with algal persistence is present and active.

SPECIES DIVERSITY AND ABUNDANCE INDICES

"Information content" of biological samples is being used commonly by biologists as a measure of diversity. Diversity in this connection means the degree of uncertainty attached to the specific identity of any randomly selected individual. The greater the number of taxa and the more equal their proportions, the greater the uncertainty, and hence, the diversity (Pielou 1966). There are several methods of measuring diversity, e.g., the formulas given by Brillouin (1962) and Shannon and Weaver (1963). The method which is appropriate depends on the type of biological sample on hand.

Pielou (1966) classifies the types of biological samples and gives the measure of diversity appropriate for each type. The Survey phytoplankton samples are what she classifies as larger samples (collections in Pielou's terminology) from which random subsamples can be drawn. According to Pielou, the average diversity per individual (H) for these types of samples can be estimated from the Shannon-Wiener formula (Shannon and Weaver 1963):

$$H = -\sum_{i=1}^{S} P_i \log_x P_i$$

where P is the proportion of the ith taxon in the sample, which is calculated from n_i/N; n_i is the number of individuals per milliliter of the ith taxon; N is the total number of individuals per ml; and S is the total number of taxa. However, Basharin (1959) and Pielou (1966) have pointed out that H calculated from the subsample is a biased estimator of the sample H, and if this bias is to be accounted for, we must know the total number of taxa present in the sample since the magnitude of this bias depends on it.

Pielou (1966) suggests that if the number of taxa in the subsample falls only slightly short of the number in the larger sample, no appreciable error will result in considering S, estimated from the subsample, as being equal to the sample value. Even though considerable effort was made to find and identify all taxa, the Survey samples undoubtedly contain a fair number of rare phytoplankton taxa which were not encountered.

In the Shannon-Wiener formula, an increase in the number of taxa and/or an increase in the evenness of the distribution of individuals among taxa will increase the average diversity per individual from its minimal value of zero. Sager and Hasler (1969) found that the richness of taxa was of minor importance in determination of average diversity per individual for phytoplankton and they concluded that phytoplankton taxa in excess of the 10 to 15 most abundant ones have little effect on H. This was verified by our own calculations. Our counts are in number per milliliter and since logarithms to the base 2 were used in our calculations, H is expressed in units of bits per individual. When individuals of a taxon were so rare that they were not counted, a value of 1/130 per milliliter or 0.008 per milliliter was used in the calculations since at least one individual of the taxon must have been present in the collection.

A Survey sample for a given lake represents a composite of all phytoplankton collected at different sampling sites on the lake during a given sampling period. Since the number of samples (M) making up a composite is a function of both the complexity of the lake sampled and its size, it should affect the richness-of-taxa component of the diversity of our phytoplankton collections. The maximum diversity (MaxH) (i.e., when the individuals are distributed among the taxa as evenly as possible) was estimated from $\log_2 S$ (Pielou 1966), while the minimum diversity (MinH), was estimated from the formula:

$$\text{MinH} = -\frac{S-1}{N}\log_2\frac{1}{N} - \frac{N-(S-1)}{N}\log_2\frac{N-(S-1)}{N}$$

given by Zand (1976). The total diversity (D) was calculated from HN (Pielou 1966). Also given in Appendix B are L (the mean number of individuals per taxa per milliliter) and K (the number of individuals per milliliter of the most abundant taxon in the sample).

The evenness component of diversity (J) was estimated from H/MaxH (Pielou 1966). Relative evenness (RJ) was calculated from the formula:

$$\text{RJ} = \frac{\text{H-MinH}}{\text{MaxH-MinH}}$$

given by Zand (1976). Zand suggests that RJ be used as a substitute for both J and the redundancy expression given by Wilhm and Dorris (1968). As pointed out by Zand, the redundancy expression given by Wilhm and Dorris does not properly express what it is intended to show, i.e., the position of H in the range between MaxH and MinH. RJ may range from 0 to 1; being 1 for the most even samples and 0 for the least even samples.

Zand (1976) suggests that diversity indices be expressed in units of "sits", i.e., in logarithms to base S (where S is the total number of taxa in the sample) instead of in "bits", i.e., in logarithms to base 2. Zand points out that the diversity index in sits per individual is a normalized number ranging from 1 for the most evenly distributed samples to 0 for the least evenly distributed samples. Also, it can be used to compare different samples, independent of the number of taxa in each. The diversity in bits per

individual should not be used in direct comparisons involving various samples which have different numbers of taxa. Since MaxH equals log S, the expression in sits is equal to $\log_S S$, or 1. Therefore diversity in sits per individual is numerically equivalent to J, the evenness component for the Shannon-Wiener formula.

SPECIES OCCURRENCE AND ABUNDANCE

The alphabetic phytoplankton species list for each lake, presented in Appendix B, gives the concentrations of individual species by sampling date. Concentrations are in cells, colonies, or filaments (CEL, COL, FIL) per milliliter. An "X" after a species name indicates that the species identified in the preliminary examination was in such a low concentration that it did not appear in the count. A blank space indicates that the organism was not found in the sample collected on that date. Column S is used to designate the examiner's subjective opinion of the five dominant taxa in a sample, based upon relative size and concentration of the organism. The percent column (%C) presents, by abundance, the percentage composition of each taxon.

LITERATURE CITED

Basharin, G. P. 1959. On a statistical estimate for the entropy of a sequence of independent random variables, pp. 333-336. In: Theory of Probability and Its Applications (translation of "Teoriya Veroyatnosei i ee Premeneniya"). N. Artin (ed). 4. Society for Industrial and Applied Mathematics, Philadelphia.

Brillouin, L. 1962. Science and Information Theory (2nd ed.). Academic Press, New York. 351 pp.

Hutchinson, G. E. 1967. A Treatise on Limnology. II. Introduction to Lake Biology and the Limnoplankton. John Wiley and Sons, Inc., New York. 1,115 pp.

Nygaard, G. 1949. Hydrobiological studies of some Danish ponds and lakes. II. (K danske Vidensk. Selsk.) Biol. Sci. 7:293.

Palmer, C. M. 1969. A composite rating of algae tolerating organic pollution. J. Phycol. 5:78-82.

Pielou, E. C. 1966. The measurement of diversity in different types of biological collections. J. Theor. Biol. 13:131-144.

Prescott, G. W. 1970. How to Know the Freshwater Algae. William C. Brown Company, Dubuque. 348 pp.

Sager, P. E., and A. D. Hasler. 1969. Species diversity in lacustrine phytoplankton. I. The components of the index of diversity from Shannon's formula. Amer. Natur. 103(929):51-59.

Shannon, C. E., and W. Weaver. 1963. The Mathematical Theory of Communication. University of Illinois Press, Urbana. 117 pp.

U.S. Environmental Protection Agency. 1975. National Eutrophication Survey Methods 1973-1976. Working Paper No. 175. Environmental Monitoring and Support Laboratory, Las Vegas, Nevada, and Corvallis Environmental Research Laboratory, Corvallis, Oregon. 91 pp.

Wilhm, V. L., and T. C. Dorris. 1968. Biological parameters for water quality criteria. Bio-Science. 18:477.

Zand, S. M. 1976. Indexes associated with information theory in water quality. J. Water Pollut. Contr. Fed. 48(8):2026-2031.

APPENDIX A

PHYTOPLANKTON SPECIES LIST FOR THE STATE OF IDAHO

Achnanthes lanceolata
Actinastrum hantzschii
v. *fluviatile*
Amphora ovalis
v. *affinis*
Anabaena flos-aquae
Ankistrodesmus falcatus
Ankistrodesmus falcatus
v. *acicularis*
Ankistrodesmus falcatus
v. *mirabilis*
Aphanizomenon flos-aquae
Aphanocapsa delicatissima
Aphanocapsa elachista
Aphanothece
Arthrodesmus
Asterionella formosa
Bulbochaete
Campylodiscus
Ceratium hirundinella
Ceratium hirundinella
f. *scotticum*
Chlamydomonas
Chroococcus limneticus
Closterium ehrenbergii
f. *magnum*
Cocconeis placentula
Cocconeis placentula
v. *lineata*
Coelastrum microporum
Coelastrum reticulatum
Coelosphaerium kuetzingianum
Coelosphaerium naegelianum
Coelosphaerium pallidum
Cosmarium
Crucigenia apiculata
Crucigenia quadrata
Crucigenia rectangularis
Crucigenia tetrapedia
Cryptomonas erosa
Cryptomonas marssonii
Cryptomonas reflexa
Cyclotella meneghiniana
Cymatopleura elliptica
Cymbella cistula
Cymbella mexicana
Cymbella minuta
v. *silesiaca*
Cymbella muelleri
Dactylococcopsis
Desmidium swartzii
Diatoma elongatum
Diatoma vulgare
Dictyosphaerium pulchellum
Dinobryon bavaricum
Dinobryon cylindricum
Dinobryon divergens
Dinobryon sertularia
Dinobryon sociale
v. *americanum*
Diploneis elliptica
Diploneis oblongella
Elakatothrix
Epithemia sorex
Epithemia turgida
Euastrum
Eudorina elegans
Euglena
Eunotia flexuosa
Eunotia incisa
Eunotia indica
Eunotia serra
v. *diadema*
Fragilaria brevistriata
Fragilaria capucina
v. *mesolepta*
Fragilaria construens
Fragilaria crotonensis
Fragilaria intermedia
Fragilaria leptostauron
Fragilaria virescens
Frustulia
Glenodinium gymnodinium
Glenodinium lamnicki
Glenodinium oculatum
Gomphonema acuminatum
Gomphonema acuminatum
v. *pusilla*
Gomphonema augur
Gomphonema olivaceum
Gomphonema parvulum
Gomphonema truncatum
Gymnodinium albulum
Gyrosigma
Hantzschia amphioxys
Hapalosiphon
Kirchneriella lunaris
Lyngbya
Mallomonas acaroides
Melosira distans
Melosira granulata
Melosira granulata
v. *angustissima*
Melosira italica

Melosira varians
Meridion circulare
Merismopedia glauca
Merismopedia minima
Merismopedia tenuissima
Micrasterias apiculata
v. *fimbriata*
Micrasterias radiata
Microchaete
Microcystis aeruginosa
Microcystis incerta
Mougeotia
Navicula aurora
Navicula cuspidata
Navicula radiosa
Neidium hitchcockii
Nitzschia acicularis
Nitzschia tryblionella
v. *levidensis*
Nitzschia vermicularis
Oedogonium
Oocystis
Oscillatoria limnetica
Pandorina morum
Pediastrum boryanum
Pediastrum duplex
v. *clathratum*
Pediastrum duplex
v. *reticulatum*
Pediastrum obtusum
Pediastrum tetras
Pediastrum tetras
v. *tetraodon*
Peridinium quadridens
Peridinium umbonatum
Peridinium willei
Pinnularia mesolepta
Pinnularia viridis
Rhizosolenia
Rhoicosphenia
Rhopalodia gibba
Scenedesmus abundans
Scenedesmus bijuga
Scenedesmus denticulatus
Scenedesmus dimorphus
Scenedesmus quadricauda
Schroederia setigera
Sphaerocystis schroeteri
Spirogyra
Staurastrum tetracerum
Stauroneis anceps
f. *linearis*
Stephanodiscus astraea
v. *minutula*
Stephanodiscus niagarae
Surirella
Synedra delicatissima
Synedra ulna
Tabellaria fenestrata
Tetradesmus wisconsinense
Tetraedron caudatum
Tetraedron caudatum
v. *longispinum*
Tetraedron lobulatum
Tetraedron minimum
Trachelomonas volvocina
Ulothrix tenerrima

APPENDIX B. SUMMARY OF PHYTOPLANKTON DATA

This appendix was generated by computer. Because it was only possible to use upper case letters in the printout, all scientific names are printed in upper case and are not italicized.

The alphabetic phytoplankton lists include taxa without species names (e.g., EUNOTIA, EUNOTIA #1, FLAGELLATE, FLAGELLATES, MICROCYSTIS INCERTA ?, CHLOROPHYTAN COCCOID CELLED COLONY). When species determinations were not possible, symbols or descriptive phrases were used to separate taxa for enumeration purposes. Each name on a list, however, represents a unique species different from any other name on the same list, unless otherwise noted, for counting purposes.

Numbers were used to separate unidentified species of the same genus. A generic name listed alone is also a unique species. A question mark (?) is placed immediately after the portion of a name which was assigned with uncertainty. Numbered, questioned, or otherwise designated taxa were established on a lake-by-lake basis; therefore NAVICULA #2 from lake A cannot be compared to NAVICULA #2 from lake B. Pluralized categories (e.g., FLAGELLATES, CENTRIC DIATOMS, SPP.) were used for counting purposes when taxa could not be properly differentiated on the counting chamber.

LAKE NAME: AMERICAN FALLS RES,
STORET NUMBER: 1601

NYGAARD TROPHIC STATE INDICES

DATE	05 15 75	08 05 75	09 18 75
MYXOPHYCEAN	01/0 E	03/0 E	1,00 E
CHLOROPHYCEAN	01/0 E	01/0 E	4,00 E
EUGLENOPHYTE	0,50 E	0/04 ?	0,20 ?
DIATOM	0,20 ?	0,14 ?	0,37 E
COMPOUND	06/0 E	06/0 E	9,00 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	05 15 75	08 05 75	09 18 75
GENUS	06	04	04
SPECIES	01	00	02

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		05 15 75	08 05 75	09 18 75
AVERAGE DIVERSITY	H	2,55	1,70	2,25
NUMBER OF TAXA	S	26,00	24,00	22,00
NUMBER OF SAMPLES COMPOSITED	M	5,00	5,00	5,00
MAXIMUM DIVERSITY	MAXH	4,70	4,58	4,46
MINIMUM DIVERSITY	MINH	0,04	0,05	0,15
TOTAL DIVERSITY	D	26848,95	10499,72	3800,25
TOTAL NUMBER OF INDIVIDUALS/ML	N	10529,00	6176,00	1689,00
EVENNESS COMPONENT	J	0,54	0,37	0,50
RELATIVE EVENNESS	RJ	0,54	0,37	0,49
MEAN NUMBER OF INDIVIDUALS/TAXA	L	404,96	257,33	76,77
NUMBER/ML OF MOST ABUNDANT TAXON	K	4856,00	3684,00	745,00

LAKE NAME: AMERICAN FALLS RES. CONTINUED
STORET NUMBER: 1601

TAXA	FORM	05 15 75 IB	05 15 75 %C	05 15 75 ALGAL UNITS PER ML	08 05 75 IB	08 05 75 %C	08 05 75 ALGAL UNITS PER ML	09 18 75 IB	09 18 75 %C	09 18 75 ALGAL UNITS PER ML
ACTINASTRUM HANTZSCHII V. FLUVIATILE	CEL									X
ANAPAENA	FIL						X			
ANKISTRODESMUS	CEL		1,0	102						
APHANIZOMENON FLOS-AQUAE	FIL				11	59,7	3684	11	44,1	745
ASTERIONELLA FORMOSA	CEL	12	20,4	2147		1,7	104			
CERATIUM HIRUNDINELLA F. SCOTTICUM	CEL									X
CHROOMONAS ?	CEL		11,7	1227		1,7	104	15	20,6	348
CLOSTERIUM	CEL									X
COCCONEIS	CEL						X			
COELASTRUM	CEL						X			
CRYPTOMONAS	CEL		2,9	307			X			
CRYPTOMONAS MARSSONII	CEL							12	14,7	248
CYCLOTELLA	CEL	11	46,1	4856						
CYCLOTELLA MENEGHINIANA	CEL								5,9	99
CYMATOPLEURA	CEL		1,0	102						
CYMBELLA #1	CEL						X			
CYMBELLA #2	CEL						X			
CYMBELLA #3	CEL			X			X			
CYMBELLA SPP.	CEL		1,5	153	15	2,5	156			
DACTYLOCOCCOPSIS	CEL						X			
DIATOMA ELONGATUM	CEL		1,0	102						
DIATOMA VULGARE	CEL	13	4,4	460			X			X
DINOBRYON SERTULARIA	CEL			X						
EUGLENA	CEL			X						X
FRAGILARIA #1	CEL			X						
FRAGILARIA #2	CEL			X						
FRAGILARIA BREVISTRIATA	CEL							13	8,8	149
FRAGILARIA CRUTONENSIS	CEL				12	24,4	1505			X
FRAGILARIA LEPTOSTAURON	CEL						X			
FRAGILARIA SPP.	CEL		0,5	51						
GLENODINIUM LOMNICKI	CEL									X
GOMPHONEMA	CEL			X			X			X
GOMPHONEMA PARVULUM	CEL						X			
GYMNODINIUM ALBULUM	CEL		1,0	102						
MELOSIRA	CEL									X
MELOSIRA GRANULATA	CEL				13	6,7	415			
MELOSIRA VARIANS	CEL			X						
MICROCYSTIS INCERTA	COL			X						
NAVICULA	CEL			X				14	3,0	50
NAVICULA #1	CEL						X			
NAVICULA #2	CEL						X			
NAVICULA #3	CEL						X			
NAVICULA SPP.	CEL				14	3,4	208			
NITZSCHIA	CEL			X						
NITZSCHIA ACICULARIS	CEL		2,9	307						
NITZSCHIA TRYBLIONELLA V. LEVIDENSIS	CEL			X						
NITZSCHIA VERMICULARIS	CEL	15	1,5	153						
OOCYSTIS	COL								3,0	50
PEDIASTRUM DUPLEX V. CLATHRATUM	COL									X
PINNULARIA MESOLEPTA	CEL									X
RHOICOSPHENIA	CEL						X			
SCENEDESMUS QUADRICAUDA	COL									X
STEPHANODIACUS	CEL		1,0	204			X			X
SURIRELLA	CEL	14	2,4	296						X
SYNEDRA ULNA	CEL									X
TOTAL				10522			6176			1689

LAKE NAME: CASCADE LAKE
STORET NUMBER: 1602

NYGAARD TROPHIC STATE INDICES

DATE	06 04 75	08 01 75	09 16 75
MYXOPHYCEAN	0/0 O	1.00 E	1.00 E
CHLOROPHYCEAN	03/0 E	0.75 E	0/03 O
EUGLENOPHYTE	0/03 ?	0/07 ?	0.33 E
DIATOM	0.29 ?	0.67 E	0.67 E
COMPOUND	05/0 E	2.25 E	2.00 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	06 04 75	08 01 75	09 16 75
GENUS	06	02	01
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		06 04 75	08 01 75	09 16 75
AVERAGE DIVERSITY	H	1.62	2.27	2.07
NUMBER OF TAXA	S	15.00	23.00	18.00
NUMBER OF SAMPLES COMPOSITED	M	5.00	5.00	5.00
MAXIMUM DIVERSITY	MAXH	3.91	4.52	4.17
MINIMUM DIVERSITY	MINH	0.03	0.10	0.12
TOTAL DIVERSITY	D	11764.44	6412.75	3717.72
TOTAL NUMBER OF INDIVIDUALS/ML	N	7262.00	2825.00	1796.00
EVENNESS COMPONENT	J	0.41	0.50	0.50
RELATIVE EVENNESS	RJ	0.41	0.50	0.49
MEAN NUMBER OF INDIVIDUALS/TAXA	L	484.13	122.83	99.78
NUMBER/ML OF MOST ABUNDANT TAXON	K	5069.00	1206.00	979.00

LAKE NAME: CASCADE LAKE
STORET NUMBER: 1602

CONTINUED

TAXA	FORM	06 04 75 IS	06 04 75 %C	06 04 75 ALGAL UNITS PER ML	08 01 75 IS	08 01 75 %C	08 01 75 ALGAL UNITS PER ML	09 16 75 IS	09 16 75 %C	09 16 75 ALGAL UNITS PER ML
ANABAENA	FIL						X			X
ANABAENA FLOS-AQUAE	FIL						X			
ANKISTRODESMUS FALCATUS V. ACICULARIS	CEL		0,5	38						
APHANIZOMENON FLOS-AQUAE	FIL				12	29,3	827	11	54,5	979
APHANOTHECE	COL					3,6	103			
ASTERIONELLA FORMOSA	CEL	11	69,8	5069	14	3,6	103		2,3	41
CENTRIC DIATOM	CEL		2,1	151						
CERATIUM HIRUNDINELLA	CEL						X			X
CHLOROPHYTAN COCCOID CELL	CEL						X			
CHROOMONAS ?	CEL					4,9	138		4,6	82
COELOSPHAERIUM NAEGELIANUM	COL									X
COSMARIUM #1	CEL						X			X
COSMARIUM #2	CEL						X			
CRYPTOMONAS	CEL	15	1,6	113				14	9,1	163
CRYPTOMONAS EROSA	CEL					2,4	69	13	11,4	204
CRYPTOMONAS MARSSONII	CEL				15	2,4	69			
CRYPTOMONAS REFLEXA	CEL		1,0	76						
DICTYOSPHAERIUM	COL			X						
DINOBRYON DIVERGENS	CEL	12	12,0	870			X			
EUDORINA ELEGANS	COL						X			X
EUGLENA	CEL									X
FRAGILARIA	CEL			X						
FRAGILARIA ?	CEL									X
FRAGILARIA CROTONENSIS	CEL		1,6	113	11	42,7	1206	13	13,6	245
MELOSIRA GRANULATA	CEL									X
MELOSIRA GRANULATA V. ANGUSTISSIMA	CEL							15	4,8	82
MELOSIRA ITALICA	CEL	13	2,1	151	13	9,8	276			
NAVICULA	CEL						X			
NITZSCHIA	CEL		1,0	76						
OOCYSTIS	COL						X			
PEDIASTRUM BORYANUM	COL			X			X			
SPHAEROCYSTIS SCHROETERI	COL					1,2	34			
STATOSPORE	CEL									X
STAURASTRUM	CEL									X
STAURASTRUM #1	CEL						X			X
STAURASTRUM #2	CEL						X			
STAURONEIS ANCEPS F. LINEARIS	CEL			X						
STEPHANODISCUS	CEL						X			
SYNEDRA	CEL			X						
SYNEDRA #1	CEL	14	8,3	605						
TOTAL				7262			2825			1796

LAKE NAME: COEUR D'ALENE
STORET NUMBER: 1603

NYGAARD TROPHIC STATE INDICES

DATE	04 04 75	07 22 75	09 09 75
MYXOPHYCEAN	0/0 O	03/0 E	3,00 E
CHLOROPHYCEAN	0/0 O	04/0 E	3,00 E
EUGLENOPHYTE	0/0 ?	0/07 ?	0/06 ?
DIATOM	0,57 E	0,75 E	0,40 E
COMPOUND	04/0 E	10/0 E	8,00 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 04 75	07 22 75	09 09 75
GENUS	03	01	00
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 04 75	07 22 75	09 09 75
AVERAGE DIVERSITY	H	0,70	2,98	2,18
NUMBER OF TAXA	S	13,00	17,00	18,00
NUMBER OF SAMPLES COMPOSITED	M	7,00	8,00	8,00
MAXIMUM DIVERSITY	MAXH	3,70	4,09	4,17
MINIMUM DIVERSITY	MINH	0,02	0,13	0,16
TOTAL DIVERSITY	D	7455,70	4520,66	2725,00
TOTAL NUMBER OF INDIVIDUALS/ML	N	10651,00	1517,00	1250,00
EVENNESS COMPONENT	J	0,19	0,73	0,52
RELATIVE EVENNESS	RJ	0,19	0,72	0,51
MEAN NUMBER OF INDIVIDUALS/TAXA	L	819,31	89,24	69,44
NUMBER/ML OF MOST ABUNDANT TAXON	K	9509,00	350,00	471,00

LAKE NAME: COEUR D'ALENE
STORET NUMBER: 1603

CONTINUED

TAXA	FORM	04 04 75			07 22 75			09 09 75		
		IB	%C	ALGAL UNITS PER ML	IB	%C	ALGAL UNITS PER ML	IB	%C	ALGAL UNITS PER ML
ANABAENA	FIL				13	15.4	233			
ANABAENA #1	FIL									X
ANKISTRODESMUS FALCATUS V. MIRABILIS	CEL					2.6	39			
APHANIZOMENON	FIL							12	37.7	471
APHANIZOMENON FLOS-AQUAE	FIL				12	17.9	272			
APHANOTHECE	COL								1.9	24
ASTERIONELLA FORMOSA	CEL	12	5.6	592			X			X
CERATIUM HIRUNDINELLA	CEL							1	1.9	24
CHLOROPHYTAN FILAMENT	FIL								1.9	24
CHROOMONAS ?	CEL					7.7	117			
CRYPTOMONAS	CEL		0.4	12	5	5.1	78			
CRYPTOMONAS EROSA	CEL							13	9.4	118
DINOBRYON DIVERGENS	CEL						X			
FRAGILARIA CROTONENSIS	CEL	14	0.8	85	14	17.9	272			X
GOMPHONEMA	CEL		0.4	42						
GYMNODINIUM	CEL			X						
MELOSIRA DISTANS	CEL	5	0.8	85		2.6	39			
MELOSIRA ITALICA	CEL	11	89.3	9509	11	23.1	350		3.8	47
MERIDION CIRCULARE	CEL			X						
NOUGEOTIA	CEL								1.9	24
OSCILLATORIA	FIL					2.6	39			
PEDIASTRUM TETRAS	COL						X			
RHIZOSOLENIA	CEL			X		2.6	39			
SCENEDESMUS	COL									X
SCENEDESMUS DIMORPHUS	COL						X			
SCENEDESMUS QUADRICAUDA	COL					2.6	39			
SCHROEDERIA SETIGERA	CEL									X
SPHAEROCYSTIS SCHROETERI	COL									X
STAURASTRUM	CEL									X
STEPHANODIACUS NIAGARAE	CEL			X						
STEPHANODISCUS NIAGARAE ?	CEL									X
SYNEDRA #1	CEL									X
SYNEDRA #2	CEL			X			X			
SYNEDRA DELICATISSIMA	CEL	13	2.8	296						
SYNEDRA ULNA	CEL							14	3.8	47
TABELLARIA FENESTRATA	CEL			X			X	11	37.7	471
TOTAL				10651			1517			1250

LAKE NAME: DWORSHAK RES.
STORET NUMBER: 1604

NYGAARD TROPHIC STATE INDICES

DATE	04 07 75	07 23 75	09 11 75
MYXOPHYCEAN	02/0 E	01/0 E	4,00 E
CHLOROPHYCEAN	01/0 E	03/0 E	2,00 E
EUGLENOPHYTE	0/03 ?	0/04 ?	0/06 ?
DIATOM	0,33 E	1,00 E	0,50 E
COMPOUND	04/0 E	06/0 E	8,00 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 07 75	07 23 75	09 11 75
GENUS	01	02	01
SPECIES	00	03	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 07 75	07 23 75	09 11 75
AVERAGE DIVERSITY	H	1,06	1,73	2,06
NUMBER OF TAXA	S	10,00	11,00	18,00
NUMBER OF SAMPLES COMPOSITED	M	5,00	5,00	5,00
MAXIMUM DIVERSITY	MAXH	3,32	3,46	4,17
MINIMUM DIVERSITY	MINH	0,08	0,16	0,18
TOTAL DIVERSITY	D	1464,92	1155,64	2282,48
TOTAL NUMBER OF INDIVIDUALS/ML	N	1382,00	668,00	1108,00
EVENNESS COMPONENT	J	0,32	0,50	0,49
RELATIVE EVENNESS	RJ	0,31	0,48	0,48
MEAN NUMBER OF INDIVIDUALS/TAXA	L	138,20	60,73	61,56
NUMBER/ML OF MOST ABUNDANT TAXON	K	1036,00	286,00	579,00

LAKE NAME: DNORSHAK RES.
STORET NUMBER: 1604

CONTINUED

TAXA	FORM	04 07 75			07 23 75			09 11 75		
		1B	%C	ALGAL UNITS PER ML	1B	%C	ALGAL UNITS PER ML	1B	%C	ALGAL UNITS PER ML
ANABAENA	FIL						X			X
ANKISTRODESMUS FALCATUS V. ACICULARIS	CEL				14	14,2	95			
ANKISTRODESMUS FALCATUS V. MIRABILIS	CEL								4,3	48
APHANIZOMENON FLOS-AQUAE	FIL							13	8,7	96
APHANOTHECE	COL									X
ASTERIONELLA FORMOSA	CEL			X			X	1	4,3	48
CHROOMONAS ?	CEL	13	13,9	192				1	4,3	48
COELOSPHAERIUM KUETZINGIANUM	COL							11	52,3	579
CRYPTOMONAS	CEL	12	11,1	154						
CRYPTOMONAS EROSA	CEL						X			X
DINOBRYON DIVERGENS	CEL								4,3	48
EUDORINA ELEGANS	COL			X			X			X
FRAGILARIA CROTONENSIS	CEL									X
GLENODINIUM	CEL									X
GYROSIGMA	CEL									X
HALLOMONAS ACAROIDES	CEL				12	42,8	286			
MELOSIRA DISTANS	CEL	11	75,0	1036			X	12	21,8	241
MELOSIRA GRANULATA V. ANGUSTISSIMA	CEL				1	7,3	49			X
NITZSCHIA	CEL			X						
OOCYSTIS	COL			X	1	35,8	239			
OSCILLATORIA #1	FIL			X						
OSCILLATORIA #2	FIL			X						
PENNATE DIATOM	CEL									X
SCENEDESMUS BIJUGA	COL									X
SPHAEROCYSTIS SCHROETERI	COL						X			
STAURASTRUM	CEL									X
SYNEDRA	CEL						X			
TABELLARIA FENESTRATA	CEL			X						
TOTAL				1392			668			1108

LAKE NAME: HAUSER LAKE
STORET NUMBER: 1605

NYGAARD TROPHIC STATE INDICES

DATE	06 03 75	07 23 75	09 10 75	10 23 75
MYXOPHYCEAN	01/0 E	3,00 E	06/0 E	08/0 E
CHLOROPHYCEAN	02/0 E	3,00 E	02/0 E	01/0 E
EUGLENOPHYTE	0/03 ?	0/06 ?	0,12 ?	0/09 ?
DIATOM	0,25 ?	0,50 E	1,00 E	0,33 E
COMPOUND	04/0 E	7,00 E	12/0 E	10/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	06 03 75	07 23 75	09 10 75	10 23 75
GENUS	05	00	11	01
SPECIES	03	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		06 03 75	07 23 75	09 10 75	10 23 75
AVERAGE DIVERSITY	H	2,12	2,62	2,55	2,62
NUMBER OF TAXA	S	14,00	14,00	22,00	19,00
NUMBER OF SAMPLES COMPOSITED	M	2,00	2,00	2,00	2,00
MAXIMUM DIVERSITY	MAXH	3,81	3,81	4,46	4,25
MINIMUM DIVERSITY	MINH	0,19	0,18	0,07	0,23
TOTAL DIVERSITY	D	1621,80	2040,98	10860,45	2274,16
TOTAL NUMBER OF INDIVIDUALS/ML	N	765,00	779,00	4259,00	868,00
EVENNESS COMPONENT	J	0,56	0,69	0,57	0,62
RELATIVE EVENNESS	RJ	0,54	0,68	0,57	0,60
MEAN NUMBER OF INDIVIDUALS/TAXA	L	54,64	55,64	193,59	45,68
NUMBER/ML OF MOST ABUNDANT TAXON	K	306,00	260,00	2225,00	186,00

LAKE NAME: HAUSER LAKE
STORET NUMBER: 1605

CONTINUED

TAXA	FORM	06 03 75 - 07 23 75						09 10 75			10 23 75		
		IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML
ANABAENA #1	FIL					4,7	37						X
ANABAENA #2	FIL								X				X
ANKISTRODESMUS FALCATUS V. ACICULARIS	CEL	1	20,0	153	1	4,7	37						
ANKISTRODESMUS FALCATUS V. MIRABILIS	CEL			X									
APHANIZOMENON FLOS-AQUAE	CEL					4,7	37	1	52,2	3225			
APHANOCAPSA DELICATISSIMA	COL								2,2	95			
APHANOTHECE	COL						X						
ASTERIONELLA FORMOSA	CEL			X	12	9,5	74			X			
CELL	CEL	1	12,0	92									
CERATIUM HIRUNDINELLA	CEL						X			X			
CHLAMYDOMONAS	CEL							15	4,4	189			
CHLOROCOCCALEAN COLONY #9	COL						X						
CHLOROPHYTAN COLONY	COL			X									
CHROOMONAS ?	CEL				15	33,4	260		3,3	142	13	21,4	186
COELOSPHAERIUM NAEGELIANUM	COL									X			X
CRYPTOMONAS	CEL	12	20,0	153							12	14,3	124
CRYPTOMONAS EROSA	CEL	1	40,0	306	14	9,5	74			X	15	10,7	93
CRYPTOMONAS REFLEXA ?	CEL			X									
DINOBRYON DIVERGENS	CEL				13	9,5	74						
EUGLENA	CEL							12	6,7	284			
FLAGELLATE	CEL								2,2	95			X
FLAGELLATE #1	CEL								1,1	47			
FRAGILARIA CROTONENSIS	CEL												X
LYNGBYA	FIL			X									
MALLOMONAS	CEL								1,1	47		7,1	62
MALLOMONAS ACAROIDES	CEL			X									X
MELOSIRA GRANULATA													
V. ANGUSTISSIMA	CEL							13	6,7	284			
MELOSIRA ITALICA	CEL			X			X	14	13,2	521	11	21,4	186
MICROCYSTIS AERUGINOSA	COL												X
NAVICULA AURORA	CEL												X
NITZSCHIA	CEL	15	8,0	61									
OOCYSTIS	CEL									X			
OSCILLATORIA	FIL									X	1	3,6	31
OSCILLATORIA ?	FIL									X			
OSCILLATORIA #1	FIL												X
OSCILLATORIA #2	FIL												X
PENNATE DIATOM	CEL								1,1	47			
PHORMIDIUM FRIGIDUM ?	FIL												X
SCHROEDERIA SETIGERA	CEL								1,1	47	14	21,4	186
SPHAEROCYSTIS SCHROETERI	COL						X						
STAURASTRUM	CEL						X						
STEPHANODISCUS	CEL								1,1	47			
SYNEDRA CYCLOPUM ?	CEL			X									
TABELLARIA FENESTRATA	CEL			X	11	23,9	186		4,4	189			X
TOTAL				745			779			4259			868

LAKE NAME: HAYDEN LAKE
STORET NUMBER: 1606

NYGAARD TROPHIC STATE INDICES

DATE	04 04 75	07 23 75	09 10 75
MYXOPHYCEAN	0/0 O	02/0 E	4,00 E
CHLOROPHYCEAN	02/0 E	02/0 E	1,00 E
EUGLENOPHYTE	0/02 ?	0/04 ?	0/05 ?
DIATOM	0,11 ?	0,33 E	0,25 ?
COMPOUND	04/0 E	05/0 E	6,00 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	04 04 75	07 23 75	09 10 75
GENUS	04	01	00
SPECIES	03	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		04 04 75	07 23 75	09 10 75
AVERAGE DIVERSITY	H	2,29	1,44	1,31
NUMBER OF TAXA	S	25,00	10,00	16,00
NUMBER OF SAMPLES COMPOSITED	N	3,00	3,00	3,00
MAXIMUM DIVERSITY	MAXH	4,64	3,32	4,00
MINIMUM DIVERSITY	MINH	0,24	0,16	0,98
TOTAL DIVERSITY	D	2644,80	871,20	167,68
TOTAL NUMBER OF INDIVIDUALS/ML	N	1160,00	605,00	128,00
EVENNESS COMPONENT	J	0,49	0,43	0,33
RELATIVE EVENNESS	RJ	0,47	0,41	0,11
MEAN NUMBER OF INDIVIDUALS/TAXA	L	45,40	60,50	8,00
NUMBER/ML OF MOST ABUNDANT TAXON	K	510,00	333,00	80,00

LAKE NAME: HAYDEN LAKE CONTINUED
STORET NUMBER: 1606

TAXA	FORM	04 04 75 IS	04 04 75 %C	04 04 75 ALGAL UNITS PER ML	07 23 75 IS	07 23 75 %C	07 23 75 ALGAL UNITS PER ML	09 10 75 IS	09 10 75 %C	09 10 75 ALGAL UNITS PER ML
AMPHORA	CEL			X						
ANABAENA	FIL				13	8,0	30			
ANABAENA 81	FIL						X			
ANKISTRODESMUS FALCATUS	CEL	1	9,7	113	14	8,0	30			
ANKISTRODESMUS FALCATUS V. ACICULARIS	CEL			X						
APHANIZOMENON FLOS-AQUAE	FIL									X
APHANOTHECE	COL							13	13,5	16
ASTERIONELLA FORMOSA	CEL	14	14,7	170			X			X
CAMPYLODISCUS	CEL	1	2,4	28						
CHLOROPHYTAN COCCOID CELLED COLONY	COL									X
CHROOCOCCUS	COL									X
CHROOMONAS ?	CEL							12	25,0	32
COCCOID CELLED COLONY	COL									X
COCCONEIS PLACENTULA	CEL			X						
COELOSPHAERIUM NAEGELIANUM	COL									X
CRUCIGENIA RECTANGULARIS	COL									X
CRYPTOMONAS	CEL			X			X			
CRYPTOMONAS EROSA	CEL									X
CYCLOTELLA COMTA ?	CEL	13	9,7	113	11	35,0	212			
DIATOMA VULGARE	CEL			X						
DINOBRYON DIVERGENS	CEL	12	44,0	510	12	55,0	333			X
DIPLONEIS OBLONGELLA	CEL			X						
EPITHEMIA TURGIDA	CEL			X						
EUNOTIA INCISA	CEL			X						
FRAGILARIA	CEL			X			X			
FRAGILARIA CROTONENSIS	CEL			X			X			X
GOMPHONEMA ACUMINATUM	CEL			X						
MELOSIRA ITALICA	CEL	11	17,1	198						
NAVICULA RADIOSA	CEL			X						
NEIDIUM	CEL									X
NEIDIUM HITCHCOCKII	CEL			X						
NITZSCHIA	CEL			X						
OOCYSTIS	CEL						X			
PINNULARIA	CEL			X						
RHOPALODIA GIBBA	CEL			X						
SPONDYLOSIUM ?	CEL									X
STEPHANODISCUS ASTRAEA V. MINUTULA	CEL							11	62,5	80
SURIRELLA	CEL			X						
SYNEDRA	CEL			X						
TABELLARIA FENESTRATA	CEL	1	2,4	28						X
TOTAL				1160			605			138

LAKE NAME: ISLAND PARK RES.
STORET NUMBER: 1607

NYGAARD TROPHIC STATE INDICES

DATE	07 30 75	09 03 75	10 20 75
MYXOPHYCEAN	03/0 E	5.00 E	01/0 E
CHLOROPHYCEAN	0/0 O	3.00 E	0/0 O
EUGLENOPHYTE	0/03 ?	0/08 ?	0/01 ?
DIATOM	0/05 ?	0.07 ?	0.67 E
COMPOUND	03/0 E	9.00 E	03/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	07 30 75	09 03 75	10 20 75
GENUS	01	00	01
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		07 30 75	09 03 75	10 20 75
AVERAGE DIVERSITY	H	2.26	0.18	2.01
NUMBER OF TAXA	S	11.00	29.00	9.00
NUMBER OF SAMPLES COMPOSITED	M	3.00	3.00	3.00
MAXIMUM DIVERSITY	MAXH	3.46	4.86	3.17
MINIMUM DIVERSITY	MINH	0.12	0.11	0.06
TOTAL DIVERSITY	D	2147.00	599.40	3250.17
TOTAL NUMBER OF INDIVIDUALS/ML	N	950.00	3330.00	1617.00
EVENNESS COMPONENT	J	0.65	0.04	0.63
RELATIVE EVENNESS	RJ	0.65	0.02	0.63
MEAN NUMBER OF INDIVIDUALS/TAXA	L	86.36	114.83	179.67
NUMBER/ML OF MOST ABUNDANT TAXON	K	454.00	3254.00	596.00

LAKE NAME: ISLAND PARK RAB;
STORET NUMBER: 1607

CONTINUED

TAXA	FORM	07 30 78			09 03 78			10 30 78		
		IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML
ACHNANTHES	CEL						X			
AMPHORA	CEL						X			
ANABAENA	FIL						X			
APHANIZOMENON FLOS-AQUAE	FIL	11	47,8	454	11	97,7	3254	11	34,2	553
ASTERIONELLA FORMOSA	CEL						X			X
CERATIUM HIRUNDINELLA	CEL						X			
CHRODMONAS ?	CEL	13	17,4	166	13	1,1	39			
CHRYSOPHYTAN FLAGELLATE	CEL	1	4,3	41				14	10,5	170
COCCONEIS	CEL			X			X			
COELOSPHAERIUM PALLIDUM	COL						X			
CRYPTOMONAS	CEL	14	8,7	83						
CRYPTOMONAS MARSSONII	CEL							13	5,3	85
CYANOPHYTAN FILAMENT	FIL	15	8,7	83						
CYMATOPLEURA ELLIPTICA	CEL						X			
EPITHEMIA TURGIDA	CEL						X			
EUDORINA ELEGANS	COL						X			
FRAGILARIA	CEL			X			X			
FRAGILARIA #1	CEL									X
FRAGILARIA CROTONENSIS	CEL						X	12	36,9	596
GOMPHONEMA	CEL						X			
GOMPHONEMA OLIVACEUM	CEL			X						
GYROSIGMA	CEL						X			
MELOSIRA GRANULATA	CEL				12	1,1	38	15	13,2	213
MELOSIRA GRANULATA V. ANGUSTISSIMA										X
MICROCYSTIS AERUGINOSA	COL						X			
MICROCYSTIS INCERTA	COL	13	8,7	83			X			
NOUGEOTIA	FIL						X			
NAVICULA	CEL	1	4,3	41						
NAVICULA #1	CEL						X			
NAVICULA #2	CEL						X			
NAVICULA CUSPIDATA	CEL						X			
PEDIASTRUM BORYANUM	COL						X			
PINNULARIA	CEL			X						
SCHROEDERIA SETIGERA	CEL						X			
SPHAEROCYSTIS SCHROETERI	COL						X			
STAURASTRUM	CEL						X			
STAURONEIS	CEL						X			
SURIRELLA	CEL						X			
ULOTHRIX	FIL									X
TOTAL				950			3330			1617

LAKE NAME: LAKE LOWELL
STORET NUMBER: 1608

NYGAARD TROPHIC STATE INDICES

DATE	08 01 75	09 16 75
MYXOPHYCEAN	1,50 E	0,33 ?
CHLOROPHYCEAN	6,00 E	2,67 E
EUGLENOPHYTE	0/15 ?	0/09 ?
DIATOM	0,60 E	0,60 E
COMPOUND	9,00 E	4,00 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	08 01 75	09 16 75
GENUS	01	03
SPECIES	00	03

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		08 01 75	09 16 75
AVERAGE DIVERSITY	H	1,29	0,85
NUMBER OF TAXA	S	30,00	21,00
NUMBER OF SAMPLES COMPOSITED	M	3,00	3,00
MAXIMUM DIVERSITY	MAXH	4,91	4,39
MINIMUM DIVERSITY	MINH	0,06	0,05
TOTAL DIVERSITY	D	9294,45	4992,05
TOTAL NUMBER OF INDIVIDUALS/ML	N	7205,00	5873,00
EVENNESS COMPONENT	J	0,26	0,19
RELATIVE EVENNESS	RJ	0,26	0,19
MEAN NUMBER OF INDIVIDUALS/TAXA	L	240,17	279,67
NUMBER/ML OF MOST ABUNDANT TAXON	K	5622,00	5126,00

LAKE NAME: LAKE LOWELL
STORET NUMBER: 1608

CONTINUED

TAXA	FORM	08 01 78			09 16 78		
		IB	%C	ALGAL UNITS PER ML	IB	%C	ALGAL UNITS PER ML
ACHNANTHES LANCEOLATA	CEL			X			
ANKISTRODESMUS FALCATUS V. ACICULARIS	CEL					2,7	160
APHANIZOMENON FLOS-AQUAE	FIL		78,0	5622	13	4,8	267
ASTERIONELLA FORMOSA	CEL			X			
CERATIUM HIRUNDINELLA	CEL			X			
CHLAMYDOMONAS	CEL		0,2	14			
CHROOMONAS ?	CEL		1,2	84			
CLOSTERIUM	CEL						X
COELASTRUM MICROPORUM	COL			X			X
COELASTRUM RETICULATUM	COL		0,2	14			X
COSMARIUM	CEL				14	1,8	107
CRUCIGENIA APICULATA	COL			X			
CRYPTOMONAS EROSA	CEL		0,9	62		0,9	53
CYCLOTELLA MENEGHINIANA	CEL		0,3	22			
CYMBELLA	CEL						X
DICTYOSPHAERIUM PULCHELLUM	COL		0,2	14			
ELAKATOTHRIX	CEL		0,3	22			
FRAGILARIA	CEL			X			
FRAGILARIA CROTONENSIS	CEL		2,9	208			X
KIRCHNERIELLA LUNARIS	COL			X			
MALLOMONAS	CEL			X			
MELOSIRA GRANULATA	CEL				11	87,3	5126
MELOSIRA ITALICA	CEL		12,0	861			
MELOSIRA VARIANS	CEL						X
MERISMOPEDIA MINIMA	COL			X			
MICROCYSTIS INCERTA	COL		0,2	14			
NAVICULA	CEL						X
NITZSCHIA #1	CEL						X
NITZSCHIA #2	CEL						X
OOCYSTIS	COL		0,7	54	1	1,9	107
PEDIASTRUM BORYANUM	COL			X			
PEDIASTRUM DUPLEX V. RETICULATUM	COL			X			X
SCENEDESMUS ABUNDANS	COL		0,3	14			
SCENEDESMUS QUADRICAUDA	COL						X
SCHROEDERIA SETIGERA	CEL		1,1	74			X
SPHAEROCYSTIS SCHROETERI	COL			X			X
STAURASTRUM #1	CEL			X			X
STAURASTRUM #2	CEL			X			
STEPHANODISCUS	CEL				1	0,9	53
STEPHANODISCUS NIAGARAE	CEL		1,7	124			
SYNEDRA	CEL			X			
TOTAL				7205			8873

LAKE NAME: MAGIC RES.
STORET NUMBER: 1609

NYGAARD TROPHIC STATE INDICES

DATE	05 15 75	08 05 75	09 17 75
MYXOPHYCEAN	02/0 E	1,50 E	02/0 E
CHLOROPHYCEAN	0/0 O	0/02 O	0/0 O
EUGLENOPHYTE	0/02 ?	0/03 ?	0/02 ?
DIATOM	02/0 E	0,25 ?	2,00 E
COMPOUND	04/0 E	2,50 E	04/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	05 15 75	08 05 75	09 17 75
GENUS	00	00	01
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		05 15 75	08 05 75	09 17 75
AVERAGE DIVERSITY	H	0,62	2,60	0,87
NUMBER OF TAXA	S	8,00	18,00	8,00
NUMBER OF SAMPLES COMPOSITED	M	3,00	3,00	3,00
MAXIMUM DIVERSITY	MAXH	3,00	4,17	3,00
MINIMUM DIVERSITY	MINH	0,02	0,40	0,02
TOTAL DIVERSITY	D	2934,46	1125,80	3367,77
TOTAL NUMBER OF INDIVIDUALS/ML	N	4733,00	433,00	3871,00
EVENNESS COMPONENT	J	0,21	0,62	0,29
RELATIVE EVENNESS	RJ	0,21	0,59	0,29
MEAN NUMBER OF INDIVIDUALS/TAXA	L	591,63	24,06	483,88
NUMBER/ML OF MOST ABUNDANT TAXON	K	4099,00	132,00	3297,00

LAKE NAME: MAGIC RES.
STORET NUMBER: 1609

CONTINUED

TAXA	FORM	05 15 75			08 05 75			09 17 75		
		IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML
ANABAENA #1	FIL			X						
ANABAENA #2	FIL				14	0,8	30			X
APHANIZOMENON FLOS-AQUAE	FIL			X	15	6,4	19	11	85,2	3297
ASTERIONELLA FORMOSA	CEL				13	12,9	56			
CERATIUM HIRUNDINELLA	CEL						X	12	5,9	230
CHROOMONAS ?	CEL		12,8	592		30,8	132	15	4,0	153
COELOSPHAERIUM KAEGELIANUM	COL						X			
COSMARIUM	CEL						X			
CRYPTOMONAS EROSA	CEL		0,9	42		17,3	75	14	1,0	38
CYMBELLA HUELLERI	CEL						X			
DIATOMA VULGARE	CEL						X			
FRAGILARIA	CEL						X			
FRAGILARIA CROTONENSIS	CEL				11	17,3	75			X
GYMNODINIUM	CEL			X						
HANTZSCHIA AMPHIOXYS	CEL						X			
MELOSIRA GRANULATA	CEL				13	0,8	30	13	4,0	153
NITZSCHIA VERMICULARIS	CEL						X			
PANDORINA MORUM	COL			X						
STAURASTRUM	CEL						X			
STEPHANODISCUS #1	CEL		86,8	4099						
STEPHANODISCUS NIAGARAE	CEL			X			X			X
SYNEDRA	CEL						X			
TOTAL				4733			433			3871

LAKE NAME: PALISADES RES.
STORET NUMBER: 1610

NYGAARD TROPHIC STATE INDICES

DATE	08 05 75	09 18 75	10 20 75
MYXOPHYCEAN	0/0 O	02/0 E	01/0 E
CHLOROPHYCEAN	0/0 O	01/0 E	0/0 O
EUGLENOPHYTE	0/0 ?	0/03 ?	0/01 ?
DIATOM	0,14 ?	0,33 E	0,75 E
COMPOUND	01/0 E	06/0 E	04/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	08 05 75	09 18 75	10 20 75
GENUS	00	00	01
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		08 05 75	09 18 75	10 20 75
AVERAGE DIVERSITY	H	2,32	1,36	2,53
NUMBER OF TAXA	S	12,00	24,00	12,00
NUMBER OF SAMPLES COMPOSITED	M	5,00	5,00	5,00
MAXIMUM DIVERSITY	MAXH	3,58	4,58	3,58
MINIMUM DIVERSITY	MINH	0,14	0,55	0,07
TOTAL DIVERSITY	D	2018,40	579,36	5108,07
TOTAL NUMBER OF INDIVIDUALS/ML	N	870,00	426,00	2019,00
EVENNESS COMPONENT	J	0,65	0,30	0,71
RELATIVE EVENNESS	RJ	0,64	0,21	0,71
MEAN NUMBER OF INDIVIDUALS/TAXA	L	72,50	17,75	168,25
NUMBER/ML OF MOST ABUNDANT TAXON	K	339,00	237,00	638,00

LAKE NAME: PALISADES RES.
STORET NUMBER: 1610

CONTINUED

TAXA	FORM	08 05 75 IS	08 05 75 %C	08 05 75 ALGAL UNITS PER ML	09 19 75 IS	09 19 75 %C	09 19 75 ALGAL UNITS PER ML	10 20 75 IS	10 20 75 %C	10 20 75 ALGAL UNITS PER ML
ANABAENA	FIL						X			
APHANIZOMENON FLOS-AQUAE	FIL				11	55,6	237	11	31,6	638
ASTERIONELLA FORMOSA	CEL	13	27,8	242	12	11,0	47	14	2,6	53
CERATIUM	CEL									X
CERATIUM HIRUNDINELLA F. ROBUSTUM ?	CEL	11	5,5	48						
CERATIUM HIRUNDINELLA F. SCOTTICUM	CEL						X			
CHLAMYDOMONAS	CEL	15	5,5	48						
CHROOMONAS ?	CEL	12	39,0	339	13	33,3	142	15	23,7	478
COCCONEIS	CEL						X			
CRYPTOMONAS	CEL	14	11,1	97						
CRYPTOMONAS EROSA	CEL						X	12	18,4	372
CRYPTOMONAS MARSSONII	CEL								5,3	106
CYCLOTELLA	CEL						4			
CYMBELLA	CEL			X						
DIATOMA VULGARE	CEL			X			X			
EPITHEMIA	CEL						X			
EUDORINA ELEGANS	COL						X			
FRAGILARIA #2	CEL						X			X
FRAGILARIA CROTONENSIS	CEL			X			X			X
FRAGILARIA INTERMEDIA	CEL			X						
FRAGILARIA VIRESCENS	CEL						X			
GOMPHONEMA OLIVACEUM	CEL		5,5	48						
MELOSIRA GRANULATA	CEL			X			X	13	5,3	106
MELOSIRA GRANULATA V. ANGUSTISSIMA	CEL								10,9	213
MOUGEOTIA	FIL						X			
NITZSCHIA	CEL						X			
NITZSCHIA ACICULARIS	CEL		5,5	48						X
OOCYSTIS	CEL						X			
PERIDINIUM #1	CEL						X			
PERIDINIUM #2	CEL						X			
SPIROGYRA	COL						X			
STEPHANODISCUS	CEL						X		2,6	53
TABELLARIA FENESTRATA	CEL						X			
ULOTHRIX ZENERRIMA	COL						X			
TOTAL				870			426			2019

LAKE NAME: LOWER PAYETTE
STORET NUMBER: 1611

NYGAARD TROPHIC STATE INDICES

DATE	06 04 75	08 01 75	09 16 75
MYXOPHYCEAN	0/0 D	0/01 D	0/01 D
CHLOROPHYCEAN	0/0 D	1,00 E	1,00 E
EUGLENOPHYTE	0/0 ?	0/01 ?	0/01 ?
DIATOM	0,33 E	0,33 E	0,50 E
COMPOUND	01/0 E	2,00 E	2,00 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	06 04 75	08 01 75	09 16 75
GENUS	03	03	01
SPECIES	00	00	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		06 04 75	08 01 75	09 16 75
AVERAGE DIVERSITY	H	1,62	2,15	1,60
NUMBER OF TAXA	S	8,00	9,00	6,00
NUMBER OF SAMPLES COMPOSITED	M	3,00	3,00	3,00
MAXIMUM DIVERSITY	MAXH	3,00	3,17	2,58
MINIMUM DIVERSITY	MINH	0,03	0,03	0,05
TOTAL DIVERSITY	D	4228,20	8412,95	2084,80
TOTAL NUMBER OF INDIVIDUALS/ML	N	2610,00	3913,00	1303,00
EVENNESS COMPONENT	J	0,54	0,68	0,62
RELATIVE EVENNESS	RJ	0,54	0,68	0,62
MEAN NUMBER OF INDIVIDUALS/TAXA	L	326,25	434,78	217,17
NUMBER/ML OF MOST ABUNDANT TAXON	K	1170,00	1505,00	629,00

LAKE NAME: LOWER PAYETTE
STORET NUMBER: 1611

CONTINUED

TAXA	FORM	06 04 75 IS	06 04 75 %C	06 04 75 ALGAL UNITS PER ML	08 01 75 IS	08 01 75 %C	08 01 75 ALGAL UNITS PER ML	09 16 75 IS	09 16 75 %C	09 16 75 ALGAL UNITS PER ML
ARTHRODESMUS	CEL					1,3	50			X
ASTERIONELLA FORMOSA	CEL	11	44,8	1170	11	38,5	1505	13	13,8	180
CHROOMONAS ?	CEL	15	3,4	90	14	9,0	351			X
CRUCIGENIA TETRAPEDIA	COL							14	3,5	45
CRYPTOMONAS	CEL	14	1,7	45						
DINOBRYON CYLINDRICUM	CEL			X						
GLENODINIUM GYMNODINIUM	CEL			X						
GYMNODINIUM ALBULUM	CEL				18	2,6	100			
MELOSIRA DISTANS	CEL	12	41,4	1080	13	32,0	1254	12	34,5	449
PERIDINIUM QUADRIDENS	CEL						X			
SYNEDRA	CEL	13	8,6	225		3,9	151			
TABELLARIA FENESTRATA	CEL			X	12	12,8	502	11	48,3	629
TETRAEDRON MINIMUM	CEL						X			
TOTAL				2610			3913			1303

LAKE NAME: LOWER TWIN LAKES
STORET NUMBER: 1612

NYGAARD TROPHIC STATE INDICES

DATE	06 03 75	07 23 75	09 10 75	10 24 75
MYXOPHYCEAN	02/0 E	4,00 E	5,00 E	01/0 E
CHLOROPHYCEAN	02/0 E	2,00 E	7,00 E	01/0 E
EUGLENOPHYTE	0/04 ?	0/06 ?	0/12 ?	0/02 ?
DIATOM	0,10 ?	0,20 ?	0,27 ?	0,50 E
COMPOUND	05/0 E	8,00 E	15,0 E	03/0 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	06 03 75	07 23 75	09 10 75	10 24 75
GENUS	00	03	01	02
SPECIES	00	03	00	03

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		06 03 75	07 23 75	09 10 75	10 24 75
AVERAGE DIVERSITY	H	1,87	2,12	1,15	1,82
NUMBER OF TAXA	S	21,00	26,00	35,00	11,00
NUMBER OF SAMPLES COMPOSITED	M	3,00	2,00	3,00	3,00
MAXIMUM DIVERSITY	MAXH	4,39	4,70	5,13	3,46
MINIMUM DIVERSITY	MINH	0,14	0,20	0,12	0,29
TOTAL DIVERSITY	D	3145,34	3243,60	4330,90	622,44
TOTAL NUMBER OF INDIVIDUALS/ML	N	1682,00	1530,00	3766,00	342,00
EVENNESS COMPONENT	J	0,43	0,45	0,22	0,53
RELATIVE EVENNESS	RJ	0,41	0,43	0,21	0,49
MEAN NUMBER OF INDIVIDUALS/TAXA	L	80,10	58,85	107,60	31,09
NUMBER/ML OF MOST ABUNDANT TAXON	K	1027,00	875,00	3081,00	128,00

LAKE NAME: LOWER TWIN LAKES
STORET NUMBER: 1612

CONTINUED

TAXA	FORM	06 03 75			07 23 75			09 10 75			10 24 75		
		%	%	ALGAL UNITS PER ML	%	%	ALGAL UNITS PER ML	%	%	ALGAL UNITS PER ML	%	%	ALGAL UNITS PER ML
AMPHORA	CEL									X			
AMPHORA OVALIS V. AFFINIS	CEL			X									X
ANABAENA	FIL	14	2.8	47			X						
ANKISTRODESMUS FALCATUS	CEL			X		9.6	131		1.1	43	14	37.4	129
ANKISTRODESMUS FALCATUS V. ACICULARIS	CEL									X			
ANKISTRODESMUS FALCATUS V. MIRABILIS	CEL									X			
APHANIZOMENON FLOS-AQUAE	FIL									X			
APHANOTHECE	COL									X			X
ASTERIONELLA FORMOSA	CEL	12	11.1	197	12	5.7	87			X			
CERATIUM HIRUNDINELLA	CEL								1.1	43			
CHLOROPHYTAN COCCOID CELL	CEL												
CHLOROPHYTAN COLONY	COL			X	14	5.7	87						
CHROOCOCCUS LIMNETICUS	COL						X						
CHRODMONAS ?	CEL					5.7	87	15	4.5	171	13	12.6	43
COELOSPHAERIUM	COL						X						
COELOSPHAERIUM KUETZINGIANUM	COL			X						X			
COELOSPHAERIUM NAEGELIANUM	COL												
COSMARIUM #1	CEL						X						
COSMARIUM #2	CEL									X			
CRUCIGENIA QUADRATA	COL												
CRUCIGENIA TETRAPEDIA	COL						X						X
CRYPTOMONAS EROSA	CEL			X						X			
CRYPTOMONAS MARSSONII	CEL					2.9	44	13	3.4	129	11	37.4	129
CYCLOTELLA	CEL									X			
CYMBELLA	CEL			X			X						
DINOBRYON BAVARICUM	CEL	13	11.1	197			X						X
DINOBRYON CYLINDRICUM	CEL	11	61.1	1027									X
DINOBRYON DIVERGENS	CEL									X			
DINOBRYON SOCIALE V. AMERICANUM	CEL						X						
DIPLONEIS ELLIPTICA	CEL									X			
EPITHEMIA	CEL						X						
EUNOTIA	CEL									X			
EUNOTIA ?	CEL	19	8.3	140									
FLAGELLATE	CEL			X	15	11.4	175						
FRAGILARIA	CEL			X						X			
FRAGILARIA CROTONENSIS	CEL			X									
FRUSTULIA	CEL									X			
GLENODINIUM OCULATUM	CEL									X			
GOMPHONEMA ACUMINATUM	CEL												
GOMPHONEMA ACUMINATUM V. PUSILLA	CEL						X						
GOMPHONEMA TRUNCATUM	CEL						X						
LUNATE CELLED COLONY	COL						X			X			X
MALLOMONAS ACAROIDES	CEL						X						
MELOSIRA	CEL			X									X
MELOSIRA DISTANS	CEL				11	57.2	875						
MELOSIRA ITALICA	CEL							12	4.5	171			
MELOSIRA VARIANS	CEL						X			X			
MERISMOPEDIA TENUISSIMA	COL						X	11	81.8	3081			
NAVICULA	CEL						X						
NAVICULA ?	CEL								1.1	43			
NAVICULA CUSPIDATA ?	CEL									X			
NITZSCHIA	CEL									X			
OOCYSTIS	COL												
OSCILLATORIA LIMNETICA	FIL									X			
PEDIASTRUM TETRAS V. TETRAODON	COL												
PERIDINIUM WILLEI	CEL			X									
PINNULARIA	CEL						X						
RHOPALODIA GIBBA	CEL									X			
SCENEDESMUS BIJUGA	COL												
SURIRELLA	CEL			X									
TABELLARIA FENESTRATA	CEL			X	13	2.9	44			X	12	12.6	43
TETRAEDRON CAUDATUM	CEL		2.8	47									
TOTAL				1682			1530			3766			342

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LAKE NAME: UPPER TWIN LAKES
STORET NUMBER: 1613

NYGAARD TROPHIC STATE INDICES

DATE	06 03 75	07 23 75	09 10 75	10 24 75
MYXOPHYCEAN	01/0 E	04/0 E	1.00 E	0.50 E
CHLOROPHYCEAN	02/0 E	01/0 E	1.00 E	0.50 ?
EUGLENOPHYTE	0/03 ?	0/05 ?	0.06 ?	0/02 ?
DIATOM	0/03 ?	0.14 ?	0.06 ?	1.00 E
COMPOUND	03/0 E	06/0 E	2.33 E	1.50 E

PALMER'S ORGANIC POLLUTION INDICES

DATE	06 03 75	07 23 75	09 10 75	10 24 75
GENUS	02	00	10	04
SPECIES	03	00	05	00

SPECIES DIVERSITY AND ABUNDANCE INDICES

DATE		06 03 75	07 23 75	09 10 75	10 24 75
AVERAGE DIVERSITY	H	2.75	1.96	4.26	2.01
NUMBER OF TAXA	S	12.00	18.00	68.00	13.00
NUMBER OF SAMPLES COMPOSITED	M	2.00	2.00	2.00	2.00
MAXIMUM DIVERSITY	MAXH	3.58	4.17	6.09	3.70
MINIMUM DIVERSITY	MINH	0.08	0.31	0.21	0.06
TOTAL DIVERSITY	D	4490.75	1138.76	18795.12	5499.36
TOTAL NUMBER OF INDIVIDUALS/ML	N	1633.00	581.00	4412.00	2736.00
EVENNESS COMPONENT	J	0.77	0.47	0.70	0.54
RELATIVE EVENNESS	RJ	0.77	0.43	0.69	0.54
MEAN NUMBER OF INDIVIDUALS/TAXA	L	136.08	32.28	64.88	210.46
NUMBER/ML OF MOST ABUNDANT TAXON	K	450.00	291.00	687.00	1200.00

LAKE NAME: UPPER TWIN LAKES CONTINUED
STORET NUMBER: 1611

TAXA	FORM	06 03 75			07 23 75			09 10 75			10 24 75		
		IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML	IS	%C	ALGAL UNITS PER ML
ACHNANTHES LANCEOLATA	CEL									X			
ANABAENA	FIL			X			X	3	3,3	147			
ANKISTRODESMUS FALCATUS	CEL	8	8,9	113			X	4	4,4	196			
ANKISTRODESMUS FALCATUS V. ACICULARIS	CEL												X
APHANOCAPSA ELACHISTA	CEL							1	1,1	49			
ASTERIONELLA FORMOSA	CEL	14	6,9	113			X			X			
BULBOCHAETE	FIL									X			
CENTRIC DIATOM	CEL												X
CHLAMYDOMONAS	CEL										15	5,3	144
CHROOCOCCUS LIMNETICUS	COL				14	8,3	48			X			
CHROOMONAS ?	CEL	2	20,7	338	15	16,7	97			X	12	15,8	432
CLOSTERIUM	CEL									X			
CLOSTERIUM EHRENBERGII F. MAGNUM	CEL									X			
COCCONEIS PLACENTULA V. LINEATA	CEL							1	1,1	49			
COELOSPHAERIUM	COL				12	8,3	48						
COSMARIUM	CEL							2	2,2	98			
CRYPTOMONAS EROSA	CEL	15	8,9	113				3	3,3	147	11	20,1	769
CRYPTOMONAS MARSSONII	CEL				11	50,1	291						
CYMBELLA	CEL						X						
CYMBELLA CISTULA	CEL									X			
CYMBELLA MEXICANA	CEL									X			
CYMBELLA MINUTA V. SILESIACA	CEL									X			
DESMIDIUM SWARTZII	CEL									X			
DINOBRYON BAVARICUM	CEL	12	20,7	338			X	1	1,1	49	1	1,8	48
DINOBRYON CYLINDRICUM	CEL	16	27,6	450									
EPITHEMIA SOREX	CEL							1	1,1	49			
EPITHEMIA TURGIDA	CEL						X	11	6,7	294			
EUASTRUM	CEL									X			
EUNOTIA	CEL							3	3,3	147			
EUNOTIA FLEXUOSA	CEL									X			
EUNOTIA INCISA	CEL									X			
EUNOTIA INDICA	CEL									X			
EUNOTIA SERRA V. DIADEMA	CEL							1	1,1	49			
FLAGELLATE	CEL										14	43,9	1200
FRAGILARIA	CEL									X			
FRAGILARIA CAPUCINA V. MESOLEPTA	CEL						X						
FRAGILARIA CONSTRUENS	CEL							14	15,6	687			
FRAGILARIA CROTONENSIS	CEL							4	4,4	196			
FRAGILARIA LEPTOSTAURON	CEL			X									
FRUSTULIA	CEL									X			
GLENODINIUM	CEL									X			
GLOEOTRICHIA ?	FIL						X						
GOMPHONEMA	CEL						X						
GOMPHONEMA ACUMINATUM	CEL									X			
GOMPHONEMA APICATUM ?	CEL									X			
GOMPHONEMA AUGUR	CEL							1	1,1	49			
GOMPHONEMA TRUNCATUM	CEL						X			X			
HAPALOSIPHON	FIL							1	1,1	49			
LYNGBYA	FIL							6	6,7	294			
MALLOMONAS	CEL			X			X				13	5,3	144
MELOSIRA ITALICA	CEL							12	15,6	687			
MELOSIRA VARIANS	CEL						X	13	5,6	245			
MERISMOPEDIA GLAUCA	COL									X			
MICRASTERIAS APICULATA V. FIMBRIATA	CEL									X			
MICRASTERIAS RADIATA	CEL									X			X
MICROCHAETE	FIL									X			
MICROCYSTIS AERUGINOSA	COL									X			
MICROCYSTIS INCERTA	COL							2	2,2	98			X
MOUGEOTIA	FIL							1	1,1	49			
NAVICULA #1	CEL									X			
NAVICULA #2	CEL									X			
NAVICULA RADIOSA	CEL							4	4,4	196			
NITZSCHIA	CEL									X			
NITZSCHIA SPP.	CEL							3	3,3	147			
OEDOGONIUM	FIL							1	1,1	49			
OOCYSTIS	CEL									X			
PEDIASTRUM BORYANUM	COL									X			
PEDIASTRUM OBTUSUM	COL									X			
PEDIASTRUM TETRAS	CEL							1	1,1	49			
PEDIASTRUM TETRAS V. TETRAODON	COL	3	3,4	56									
PERIDINIUM UNBONATUM	CEL	3	3,4	56									
PERIDINIUM WILLEI	CEL												X
PINNULARIA VIRIDIS	CEL									X			
RHOPALODIA GIBBA	CEL							3	3,3	147			
SCENEDESMUS DENTICULATUS	COL									X			
STAURASTRUM	CEL							1	1,1	49			X
STAURASTRUM TETRACERUM	CEL									X			
STICHOCOCCUS ?	CEL				13	16,7	97						

LAKE NAME: UPPER TWIN LAKES
STORET NUMBER: 1613

CONTINUED

TAXA	FORM	06 03 75			07 23 75			09 10 75			10 24 75		
		1B	%C	ALGAL UNITS PER ML	1B	%C	ALGAL UNITS PER ML	1B	%C	ALGAL UNITS PER ML	1B	%C	ALGAL UNITS PER ML
SURIRELLA	CEL									X			X
SYNEDRA	CEL							1.11		49			
TABELLARIA FENESTRATA	CEL	131	3.41	56			X			X			
TETRADESMUS WISCONSINENSE	CEL									X			
TETRAEDRON CAUDATUM V. LONGISPINUM	CEL									X			
TETRAEDRON LOBULATUM	CEL							1.11		49			
TRACHELOMONAS VOLVOCINA	CEL							1.11		49			
TOTAL				1633			591			4412			2736